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Design, Implementation and Performance Evaluation of Robust and Secure Watermarking Techniques for Digital Coloured Images

Abdallah Saleem Nawaf Al-Tahan Al-Nu'aimi

BSc, MSc

Doctor of Philosophy

2009

UNIVERSITY OF BRADFORD

MAKING KNOWLEDGE WORK

Design, Implementation and Performance Evaluation of Robust and Secure Watermarking Techniques for Digital Coloured Images

Designing new adaptive and robust imaging techniques for embedding and extracting 2D watermarks in the spatial and transform domain using imaging and signal processing techniques

Abdallah Saleem Nawaf Al-Tahan Al-Nu'aimi

BSc, MSc

A Thesis Submitted for the Degree of

Doctor of Philosophy

Department of

Electronic Imaging and Media Communications

School of Computing, Informatics and Media

University of Bradford

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Abdallah Saleem Nawaf Al-Tahan Al-Nu'aimi
Graduate Department of Electronic Imaging and Media Communications
School of Computing, Informatics and Media

Abstract

The tremendous spreading of multimedia via Internet motivates the watermarking as a new promising technology for copyright protection. This work is concerned with the design and development of novel algorithms in the spatial and transform domains for robust and secure watermarking of coloured images. These algorithms are adaptive, content-dependent and compatible with the Human Visual System (HVS). The host channels have the ability to host a large information payload. Furthermore, it has enough capacity to accept multiple watermarks.

This work achieves several contributions in the area of coloured images watermarking. The most challenging problem is to get a robust algorithm that can overcome geometric attacks, which is solved in this work. Also, the search for a very secure algorithm has been achieved via using double secret keys. In addition, the problem of multiple claims of ownership is solved here using an unusual approach. Furthermore, this work differentiates between terms, which are usually confusing the researchers and lead to misunderstanding in most of the previous algorithms.

One of the drawbacks in most of the previous algorithms is that the watermark consists of a small numbers of bits without strict meaning. This work overcomes this weakness

in using meaningful images and text with large amounts of data. Contrary to what is found in literature, this work shows that the green-channel is better than the blue-channel to host the watermarks.

A more general and comprehensive test bed besides a broad band of performance evaluation is used to fairly judge the algorithms.

Dedication and Acknowledgements

First and foremost, I thank ALLAH to gave me the ability to finish my thesis. I dedicate this thesis with love to my mother, the most important person in my life and to the spirit of my father.

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